PTO 08-4580

CC = DE
19980514
OLS
19646892

TIME CYCLE-RELATED BILLING UNIT-USAGE DISPLAY
[Zeittakt-bezogene Tarifeinheiten-Verbrauchsanzeige]

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UNITED STATES PATENT AND TRADEMARK OFFICE
WASHINGTON, D.C. APRIL 2008
TRANSLATED BY: THE MCELROY TRANSLATION COMPANY

PUBLICATION COUNTRY	(19):	DE
DOCUMENT NUMBER	(10):	19646892
DOCUMENT KIND	(12):	OLS
PUBLICATION DATE	(43):	19980514
APPLICATION NUMBER	(21):	19646982.2
APPLICATION DATE	(22):	19961113
INTERNATIONAL CLASSIFICATION[6]	(51):	H 04 M 15/28
		H 04 M 1/00
		G 04 F 10/00
PUBLICATIONS CITED	(56):	DE 44 14 732 A1
		DE 32 21 695 A1
		DE 91 12 852 U1
		WO 96 18 259 A1
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APPLICANT	(71):	Deutsche Telekom AG
TITLE	(54):	TIME CYCLE-RELATED BILLING UNIT-USAGE DISPLAY
FOREIGN TITLE	[54A]:	Zeittakt-bezogene Tarifeinheiten-Verbrauchsanzeige

The invention relates to a time cycle-related billing unit-usage display device for a telecommunications end device, in particular, a telephone, according to the preamble of Claim 1.

Billing-unit counters are known, which are either integrated into a telephone or connected before the telephone. The known billing-unit counters display to a customer the costs incurred during a telephone call and also, after disconnecting the call, the total costs of the call. Especially in view of the background that the connection costs are dependent on the time of day, the day of the week, and also the distance between the calling and the receiving parties, the party responsible for the costs is interested not only in the running costs of a call or the total costs at the end of the call, but he would also like to know how long, for example, the current time cycle is, in order to be able to better optimize the call costs.

Therefore, the invention is based on the task of creating a time cycle-related billing unit-usage display device, which provides the party responsible for the costs more transparency in the usage of billing units during an existing telecommunications connection.

The invention solves the technical problem with the features of Claim 1.

So that the party responsible for the costs can gain a better overview of the costs to be expected for the call, it is necessary that the duration of the current time cycle can be displayed during a communications connection. For this purpose, the time cycle-related billing unit-usage display device has a detector device for determining the duration of the current time cycle, wherein the duration can be displayed continuously on a display allocated to the usage display device.

Advantageous refinements are specified in the subordinate claims.

To further improve the billing-unit transparency during a connection, not only the duration of the current time cycle, but also the progressive usage of a defined billing unit can be monitored by the customer himself. For this purpose, the time cycle-related billing unit-usage display device has a counter, which progressively counts, as a response to each received billing unit request signal, the

elapsed time or the related remaining time until the receipt of the next billing unit request signal and transmits this time to the display. In the description as a whole and also in the claims, the term "billing unit request signal" is understood to be, in an analog case, the conventional count pulse (16-kHz pulse) and, in the case of a digital application, control information transmitted, for example, via the D-channel of the ISDN base connection for specifying a new time cycle.

Instead of displaying the elapsed time or the remaining time between two successive billing unit request signals, it is possible to calculate and display the associated consumed or remaining monetary value. The current billing unit equals 0.12 DM per time cycle.

For determining the duration of the current time cycle, the time cycle-related billing unit-usage display device can include a timing device, which measures the time difference at least between the first and second billing unit request signals after the beginning of the connection. Such a billing unit-usage display device is relatively simple to realize. However, for the first time the duration of the second time cycle after the beginning of a communications connection can be displayed.

To be able to display the duration of the current time cycle after already receiving the first billing unit request signal in the form of a monetary value or units of time, there is a memory device for storing time of day-dependent, day of week-dependent, and/or distance-dependent billing units, wherein the detector device is designed for determining the duration of the current time cycle from the currently valid billing unit.

According to a third embodiment, which is meaningful only for an analog subscriber line, the detector device is designed for the demodulation of count pulses each modulated with information on the duration of the time cycle. This means that the count pulse from an exchange to a subscriber line device has been modulated with the corresponding information.

The invention will be explained in more detail below with reference to an embodiment in connection with the accompanying drawing.

Figure 1 shows a telecommunications end device, which is designated in general with 10 and which is, in our example, an analog telephone. The telephone 10 is connected to an exchange via an analog subscriber line device 30 and a subscriber line (not shown). In the telephone there can be a time cycle-related billing unit-usage display device 15, which can include a display 20, a detector device 40, which is still to be described in more detail and which is connected to the display, and also optionally a memory device 50, a counter 60, and a device 70 for converting units of time into corresponding monetary values. The billing unit-usage device 15, however, can also be connected externally to the telephone 10. In this case, it is conceivable that the billing unit-usage display device 15 has its own display and the detector device 40 is therefore connected to a display arranged in the telephone. The analog telephone 10 is designed, for example, for receiving 16-kHz count pulses, which are transmitted during a call connection to the subscriber line device 30. In the memory 50, device-specific internal software can be stored, which contains, among other things, several billing units, which set the corresponding duration of a time cycle as a function of the day of the week, the time of day, and the distance between a calling and a receiving party.

The function of the time cycle-related billing unit-usage display device 15 is explained in more detail below in connection with the telephone 10. Now it shall be assumed that the user of the telephone 10 wants to initiate a call connection to a remote user. For example, at the same time as the beginning of the call, the exchange transmits a first count pulse to the analog subscriber line device 30. As a function of the selected call number, the current time of day, and the day of the week, the detector device 40 reads the associated billing unit from the memory device 50. With the help of the read billing unit, the detector device 40 can determine the duration of the current time cycle. In other words, the detector device 15 is

in the position, immediately after receipt of the first count pulse, to calculate the time span up to the receipt of the second count pulse. The duration of this time cycle is then displayed to the user on the display 20. The duration of the determined time cycle is similarly transmitted to the counter 60, which progressively measures, as a response to the first received count pulse, the elapsed time or the related remaining time until the receipt of the second count pulse and transmits this time to the display 20. If the duration of the time cycle determined by the detector device 40 equals, for example, 30 seconds, the counter 60 counts either from 0 to 30 or from 30 to 0. Here, the units of time to display (seconds, milliseconds) is set according to accuracy requirements. Instead of displaying the elapsed time or remaining time between the two count pulses (the time distance between two successive count pulses is also designated as the time cycle or billing unit) to the customer, the associated consumed or remaining monetary value can also be displayed to the customer with respect to the current billing unit. For this purpose, the converting device 70 converts the elapsed time or remaining time into a corresponding consumed or remaining monetary value. In this way, the user responsible for the costs is in the position to monitor not only the duration of the current time cycle, but also the currently remaining value of the billing unit paid in advance. After receipt of the second count pulse, the detector device 40 recalculates on the basis of the current billing unit the duration of the current time cycle and transmits this both to the display 20 and also to the counter 60. The counter 60 is triggered by the received second count pulse and then progressively measures, in turn, the elapsed time or the related remaining time until the receipt of the third count pulse. If the current billing unit changes during the call, then the detector device 40 reads the new billing unit in due time before the change from the memory device 50. In this way, it is guaranteed that the correct, i.e., currently valid duration of the current time cycle or the correct elapsed time or remaining time between two successive count pulses is always displayed to the user responsible for the costs. The timely reading of the valid billing unit can also be realized by means of a

programmable control unit, which can be connected to a clock and to an electronic calendar. It is also conceivable that the detector device 40 itself is connected to an electronic calendar and to a clock.

According to a simplified embodiment, the billing unit-usage display device includes the display 20, the counter 60, the converting device, and the detector device 40. The detector device 40 this time involves a timing device, which measures the time difference between the first and second count pulse, calculated from the beginning of the connection. This has the disadvantage, however, that the user responsible for the costs is first informed on the duration of the current time cycle at the beginning of the second time cycle. The counter 60 receives from the detector device 40 the determined time cycle duration and counts, as already mentioned above, as a response to each received time pulse, the elapsed time or remaining time between two count pulses.

In another embodiment, which is meaningfully suitable only for analog telecommunications devices, in the exchange a modulator is implemented which modulates information containing the duration of each time cycle on each 16 kHz pulse. In this case, the detector device 40 is formed as a modulator, which can demodulate the modulated time pulses, in order to retrieve the corresponding duration of the time cycle. In this embodiment, it is guaranteed that the correct time cycle can also be determined for a change in time zone during a connection.

Claims

1. Time cycle-related billing unit-usage display device for a telecommunications end device (10), characterized by a detector device (40) for determining the duration of the current time cycle, which can be displayed continuously on a display (20) allocated to the usage display device (15).

2. Time cycle-related billing unit-usage display device according to Claim 1, characterized by a counter (60), which progressively counts, as a response to each received billing unit request signal, the

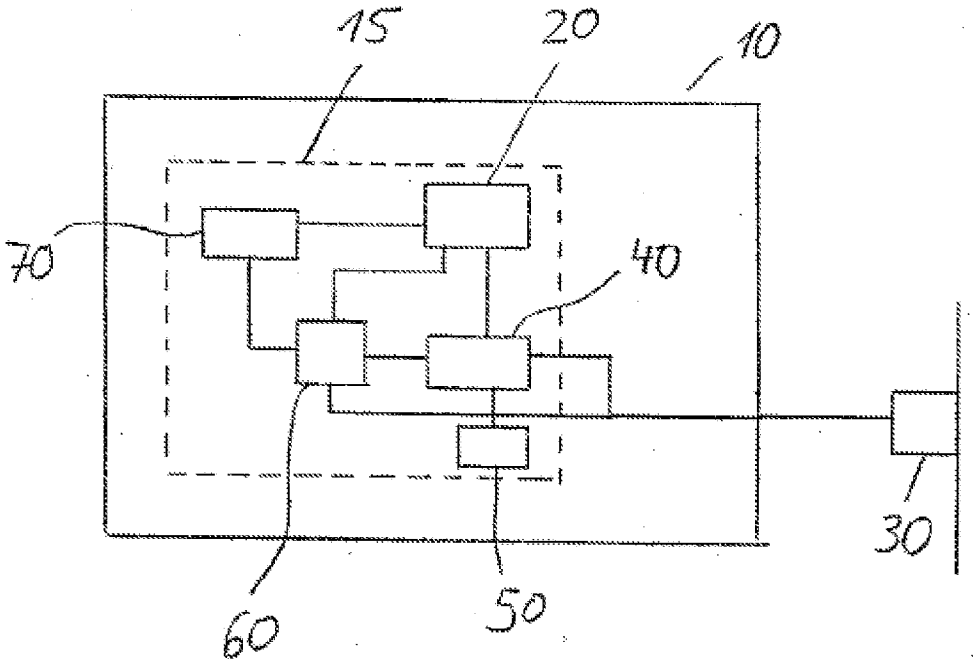
elapsed time or the related remaining time until receipt of the next billing unit request signal and transmits this time to the display (20).

3. Time cycle-related billing unit-usage display device according to Claim 2, characterized by a device (70) for the continuous conversion of the elapsed time or remaining time into a proportional consumed or remaining billing-unit value.

4. Time cycle-related billing unit-usage display device according to one of Claims 1-3, characterized in that the detector device (40) includes a timing device, which measures the time difference at least between the first and second billing unit request signals after the beginning of the connection.

5. Time cycle-related billing unit-usage display device according to one of Claims 1-3, characterized by a memory device (50) for storing time of day-dependent, day of week-dependent, and/or distance-dependent billing units, wherein the detector device is designed for determining the duration of the current time cycle from the current billing unit.

6. Time cycle-related billing unit-usage display device according to one of Claims 1-3, characterized in that the detector device (40) is designed for the demodulation of billing unit pulses modulated with information on the duration of the time cycle.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